CLAIMS

What is claimed is:

1. An implantable endolumenal stent assembly, comprising:

an implantable stent with a first end portion with a first end, a second end portion with a second end, a body portion between the proximal and distal end portions, a length between the first and second ends, a passageway along a longitudinal axis between a first longitudinal opening at the first end and second longitudinal opening at the second end, a circumference around the longitudinal axis, and a diameter transverse to the longitudinal axis;

a bioactive agent coupled to the stent;

wherein the stent is adapted to be delivered to a location within a lumen in a body of a patient in a radially collapsed condition with a collapsed diameter;

wherein at the location the stent is adjustable from the radially collapsed condition to a radially expanded condition with an expanded diameter that is greater than the collapsed diameter and that is adapted to engage a wall of the lumen at the location; and

wherein the stent in the radially expanded condition at the location exhibits a gradient of varied elution profile with respect to the bioactive agent along the length.

2. An implantable endolumenal stent assembly, comprising:

an implantable stent with a first end portion with a first end, a second end portion with a first end, a body portion between the first and second end portions, a length between the first and second ends, a passageway extending along a longitudinal axis between a first longitudinal opening at the first end and a second longitudinal opening at the second end, a circumference around the longitudinal axis, and a diameter transverse to the longitudinal axis;

wherein the stent is adapted to be delivered to a location within a lumen in a body of a patient in a radially collapsed condition with a collapsed diameter;

wherein the stent at the location is adjustable from the radially collapsed condition to a radially expanded condition with an expanded diameter that

is greater than the collapsed diameter and is adapted to engage a wall of the lumen at the location;

wherein in the radially expanded condition at the location the first end portion comprises a first lattice structure;

wherein in the radially expanded condition at the location the second end portion comprises a second lattice structure; and

wherein the first and second lattice structures are different.

3. An endolumenal stent system, comprising:

an implantable stent with a first end portion with a first end, a second portion with a second end, a body portion between the first and second end portions, a length between the first and second ends, a passageway extending along a longitudinal axis between a first opening at the first end and a second opening at the second end, a circumference around the longitudinal axis, and a diameter transverse to the longitudinal axis;

wherein the stent is adapted to be delivered to a location within a lumen in a body of a patient in a radially collapsed condition with a collapsed diameter;

wherein at the location the stent is adjustable from the radially collapsed condition to a radially expanded condition with an expanded diameter that is greater than the collapsed diameter and that is adapted to engage a wall of the lumen at the location;

wherein in the radially expanded condition the body portion comprises at least one longitudinal segment with a circumferential array of body crowns that are respectively separated along the circumference by gaps across a first inter-crown distance;

wherein in the radially expanded condition the second end portion comprises a circumferential array of end crowns that are respectively separated along the circumference by gaps across a second inter-crown distance; and

wherein the first and second inter-crown distances are different.

4. An implantable endolumenal stent assembly, comprising:

an implantable stent with a first end portion with a first end, a second end portion with a second end, a body portion between the first and second end portions, a length between the first and second ends, a passageway extending along

a longitudinal axis between a first longitudinal opening at the first end and a second longitudinal opening at the second end, a circumference around the longitudinal axis, and a diameter transverse to the longitudinal axis;

wherein the stent is adapted to be delivered to a location within a lumen in a body of a patient in a radially collapsed condition with a collapsed diameter;

wherein at the location the stent is adjustable from the radially collapsed condition to a radially expanded condition with an expanded diameter that is greater than the collapsed diameter and that is adapted to engage a wall of the lumen at the location;

wherein the stent comprises a lattice structure arranged in a pattern around the circumference and between the first and second end portions;

wherein the lattice structure along the first and second end portion comprises a circumferential array of end crowns;

wherein in the radially collapsed condition the array of end crowns along at least one of the first and second end portions are overlapped; and

wherein in the radially collapsed condition the lattice structure along the body portion does not comprise overlapping regions.

5. An implantable endolumenal stent assembly, comprising:

an implantable stent with a first end portion with a first end, a second end portion with a second end, a body portion between the first and second end portions, a length between the first and second ends, a passageway extending along a longitudinal axis between a first longitudinal opening at the first end and a second longitudinal opening at the second end, a circumference around the longitudinal axis, a diameter transverse to the longitudinal axis;

wherein the stent comprise a lattice structure constructed of a non-superelastic, non-shape memory metal alloy material;

wherein the stent is adapted to be delivered to a location within a lumen in a body of a patient with the networked lattice scaffold in a radially collapsed condition with a collapsed diameter that is plastically deformed from an initial memory condition at an initial diameter;

wherein at the location the networked lattice scaffold is adjustable under force from the radially collapsed condition to a radially expanded condition

with an expanded diameter that is greater than the collapsed diameter and that is adapted to engage a wall of the lumen at the location;

wherein the initial diameter has a value that is closer to the expanded diameter than to the collapsed diameter.

6. A kit for providing at least one stent to be implanted at a location within a lumen in a body of a patient, comprising:

first and second delivery systems each having a proximal end portion and a distal end portion that is adapted to be positioned at the location with the proximal end portion extending externally from the patient;

first and second implantable stents each with a first end portion with a first end, a second end portion with a second end, a body portion between the first and second ends, a length between the first and second ends, a passageway extending along a longitudinal axis between a first opening at the first end and a second opening at the second end, a circumference around the longitudinal axis, and a diameter transverse to the longitudinal axis;

wherein each of the first end portions comprises a lattice structure that is different than a lattice structure along the corresponding body portion and also different than a lattice structure along the corresponding second end portion of the respective stent;

wherein the first stent is coupled to the distal end portion of the first delivery system with the first end located proximally of the second end;

wherein the second stent is coupled to the distal end portion of the second delivery system with the first end located distally of the second end;

wherein the first and second stents in respective radially collapsed conditions with respective collapsed diameters are adapted to be delivered to the location by the first and second delivery systems, respectively; and

wherein at the location each of the respective stents is adjustable from the respective radially collapsed condition to a radially expanded condition with an expanded diameter that is greater than the respective collapsed diameter and is adapted to circumferentially engage a wall of the lumen at the location.

7. An implantable endolumenal stent assembly, comprising:

first and second implantable stents each with a first end portion with a first end, a second end portion with a second end, a body portion between the first

and second ends, a length between the first and second ends, a passageway extending along a longitudinal axis between a first opening at the first end and a second opening at the second end, a circumference around the longitudinal axis, and a diameter transverse to the longitudinal axis;

a bioactive agent coupled to each of the first and second stents;

wherein the first and second stents are adapted to be implanted in partial overlapping arrangement between respective confronting end portions along a wall of a lumen in a body of a patient with an overall stented segment length and also with an overlap zone comprising the overlapping end portions over a distance along the wall that is less than the overall stented segment length;

wherein the overlapping arrangement of the first and second stents is adapted to exhibit a combined elution profile of the bioactive agent along the overall stented segment length; and

wherein the elution profile along the overlap zone is substantially less than double the drug elution profile along the remaining portions of the stented segment.

8. The assembly of claim 2, 3, 4, or 5, further comprising:

a bioactive agent coupled to the stent;

wherein the stent is adapted to exhibit a gradient of varied elution profile along the length.

9. The assembly of claim 6, further comprising:

a bioactive agent coupled to each of the first and second stents; and

wherein each of the first and second stents is adapted to exhibit a gradient of varied elution profile along the length.

10. The assembly of claim 7, wherein each of the first and second stents is adapted to exhibit a gradient of varied elution profile along the respective stent length.

11. The assembly of claim 1, 8, 9 or 10, wherein the gradient of varied elution profile comprises:

a first elution profile along the first end portion;

a second elution profile along the body portion; and

a third elution profile along the second end portion that is different than the first and second elution profiles.

12. The assembly of claim 1, 8 or 10, wherein the gradient of varied elution profile comprises:

a first elution profile along the first end portion;

a second elution profile along the body portion; and

a third elution profile along the second end portion that is less than the first and second elution profiles.

13. The assembly of claim 12, wherein the third elution profile comprises about a zero dose elution of the bioactive agent.

14. The assembly of claim 13, wherein both the first and second elution profiles comprise a therapeutic dose elution.profile of the bioactive agent.

15. The assembly of claim 1, 8 or 10, wherein the gradient of varied elution profile comprises:

a first elution profile along the first end portion;

a second elution profile along the body portion; and

a third elution profile along the second end portion that is greater than the second elution profile.

16. The assembly of claim 15, wherein the first elution profile is greater than the second elution profile.

17. The assembly of claim 16, wherein the first and third elution profiles are substantially equivalent.

18. The assembly of claim 16, wherein the third elution profile is greater than the first elution profile.

19. The assembly of claim 1 or 8, wherein:

the gradient of varied elution profile comprises a first elution profile along the first end portion, a second elution profile along the body portion, and a third elution profile along the second end portion that is greater than the second elution profile;

the second end portion is adapted to be a proximal end portion of the stent in the radially expanded condition at the location; and

the first end portion is adapted to be a distal end portion of the stent in the radially expanded condition at the location.

20. The assembly of claim 1, 2, 3, 4, 5, 6, 7, or 8, wherein:

in the radially expanded condition the first end portion comprises a first array of first end crowns arranged in a first configuration around the circumference;

in the radially expanded condition the second end portion comprises a second array of second end crowns arranged in a second configuration around the circumference; and

the second configuration is different than the first configuration.

21. The system of claim 1, 2, 3, 4, or 5, wherein:

the first end portion comprises a circumferential array of m first end crowns;

the second end portion comprises a circumferential array of n second end crowns; and

n is greater than m.

22. The system of claim 21, wherein:

the body portion comprises at least one longitudinal segment with a circumferential array of m body crowns.

23. The system of claim 21, wherein the body portion comprises at least one longitudinal segment with a circumferential array of n body crowns.

24. The system of claim 1, 3, 4, and 5, wherein:

the first end portion comprises a first lattice structure;

the second end portion comprises a second lattice structure; and

the first and second lattice structures are different.

25. The system of claim 2 or 24, wherein:

the body portion comprises a third lattice structure; and

the third lattice structure is substantially similar to the first lattice structure.

26. The system of claim 25, wherein:

the first lattice structure comprises an array of m first end crowns;

the second and third lattice structures comprise arrays of n second end crowns and n body crowns, respectively; and

n is greater than m.

27. The system of claim 2 or 24, wherein:

the first lattice structure comprises a circumferential array of m first end crowns;

the second lattice structure comprises an array of n second end crowns; and

n is less than m.

28. The system of claim 27, wherein n is equal to or less than one-half of m.

29. The system of claim 2 or 24, wherein:

the first lattice structure comprises a circumferential array of first end crowns with a first configuration;

the second lattice structure comprises a circumferential array of second end crowns with a second configuration; and

the first and second configurations are different.

30. The system of claim 29, wherein:

the first configuration comprises a first periodic distance between adjacent first end crowns, and also a first inter-crown distance between facing sides of adjacent first end crowns; and

the second configuration comprises a second periodic distance between adjacent first end crowns, and also a second inter-crown distance between facing sides of adjacent first end crowns;

the second inter-crown distance is less than the first inter-crown distance.

31. The system of claim 2, wherein:

the first lattice structure comprises a circumferential array of first end-crowns with a first periodic distance and a first inter-crown distance;

the second lattice structure comprises a circumferential array of second end crowns with a second periodic distance and a second inter-crown distance.

32. The system of claim 3, wherein:

the body portion comprises a first lattice structure with a first periodic distance and a first inter-crown distance;

the second end portion comprises a second lattice structure with a circumferential array of second end crowns with a second periodic distance and a second inter-crown distance.

33. The system of claim 31 or 32, wherein the second periodic distance is substantially equal to the first periodic distance.

34. The system of claim 31 or 32, wherein the second periodic distance is substantially greater than the first periodic distance.

35. The system of claim 31 or 32, wherein at least one of the second end crowns comprises a curvilinear bulb-shaped member extending longitudinally and circumferentially from respective ends of two converging struts.

36. The system of claim 35, wherein the curvilinear bulb-shaped member comprises an invagination between two adjacent bulb-shaped regions.

37. The system of claim 35, wherein each of the second end crowns comprises a curvilinear bulb-shaped member extending longitudinally and circumferentially from respective ends of two adjacent converging struts.

38. The system of claim 37, wherein:

each curvilinear bulb-shaped member comprises a first width along the longitudinal axis, and a second width along the circumferential axis transverse to the longitudinal axis; and

the first and second widths are different, such that the curvilinear bulb-shaped member is out of round.

39. The system of claim 37, wherein:

the adjacent pairs of converging struts converge along reference axes of convergence; and

each said bulb-shaped member extends longitudinally beyond the intersection of the axes of convergence of the respective pair of converging struts to which the bulb-shaped member is coupled.

40. The system of claim 37, wherein:

the array of second end crowns comprises a first array of first bulb-shaped members and a second array of second bulb-shaped members;

the first and second arrays of first and second bulb-shaped members are arranged about the circumference in alternating fashion; and

the first and second bulb-shaped members have different dimensions.

41. The system of claim 40, wherein the first and second bulb-shaped members have similar shapes but different sizes.

42. The system of claim 41, wherein the different sizes comprise different widths transverse to the longitudinal axis.

43. The system of claim 40, wherein the first and second bulb-shaped members have different shapes.

44. The system of claim 31 or 32, wherein:

the first lattice structure comprises a first scaffold member with a first thickness;

the second lattice structure comprises a second scaffold member with a second thickness; and

the second thickness is less than the first thickness.

45. The system of claim 31 or 32, wherein:

the second lattice structure is more flexible than the first lattice structure transverse to the longitudinal axis.

46. The system of claim 32, wherein:

each of the body crowns comprises a first confronting edge with a first radius of curvature relative to the longitudinal axis;

each of the second end crowns comprise a second confronting edge at the second end with a second radius of curvature relative to the longitudinal axis; and

the second radius of curvature is greater than the first radius of curvature such that the second confronting edge comprises a less traumatic surface against tissue confronting the second end.

47. The system of claim 31, wherein the first and second inter-crown distances are different.

48. The system of claim 32 or 47, wherein:

the first and second periodic distances are substantially equivalent; and

the second inter-crown distance is less than the first inter-crown distance.

49. The system of claim 48, wherein the second inter-crown distance is less than half of the second periodic distance.

50. The system of claim 48, wherein the second inter-crown distance is less than one-third of the second periodic distance.

51. The system of claim 48, wherein the second inter-crown distance is less than one-quarter of the second periodic distance.

52. The system of claim 48, wherein the second inter-crown distance is less than half of the first inter-crown distance.

53. The system of claim 48, wherein the second inter-crown distance is less than one-third of the first inter-crown distance.

54. The system of claim 48, wherein the second inter-crown distance is less than one-quarter of the first inter-crown distance.

55. The assembly of claim 1, 8, or 9, wherein the bioactive agent comprises an anti-restenosis agent.

56. The assembly of claim 55, wherein the bioactive agent comprises an anti-proliferative agent.

57. The assembly of claim 55, wherein the anti-restenosis agent comprises an anti-inflammatory agent.

58. The assembly of claim 1, 8, or 9, wherein the bioactive agent comprises sirolimus, paclitaxel, everolimus, tacrolimus, erythromycin, heparin, coumadin, clopidogrel, abciximab, !!b/IIIa inhibitor, exochelin, DAA-1, ACE inhibitor, angiotensin receptor antagonist, CDK inhibitor, nitric oxide, a nitric oxide promoter, a nitric oxide donor, sialokinin, analogs or derivatives thereof, or combinations or blends thereof.

59. The assembly of claim 1 or 8, wherein:

the second end portion is adapted to be the proximal end portion of the stent in the radially expanded condition at the location; and

the first end portion is adapted to be the distal end portion of the stent in the radially expanded condition at the location.

60. The assembly of claim 59, wherein:

the second end portion is adapted to deliver a therapeutic dose of the bioactive agent over a denser pattern in vessel wall tissue at the proximal end portion versus at the distal end portion.

61. The assembly of claim 60, wherein:

the proximal end portion is adapted to elute the bioactive agent over a denser circumferential pattern along the proximal end portion with less gaps than at the distal end portion.

62. The assembly of claim 6, wherein the respective second end portion of each of the first and second stents is adapted to elute a bioactive agent according to

a first elution profile, the respective body and first end portions of each of the first and second stents is adapted to elute the bioactive agent according to a second elution profile, and the first elution profile is substantially less than the second elution profile.

63. The assembly of claim 62, wherein the first elution profile is a substantially zero dose elution profile of the bioactive agent, and the second elution profile is a non-zero dose elution profile.

64. A method for stenting a wall of a lumen in a body of a patient, comprising:

delivering a stent to a location within the lumen in a radially collapsed condition with a collapsed diameter;

adjusting the stent at the location from a radially collapsed condition to a radially expanded condition with an expanded diameter that is greater than the collapsed diameter and that is adapted to engage a wall of the lumen at the location; and

delivering a bioactive agent into the wall of the lumen at the location according to a gradient of varied dose delivery profile along the length of the stent.

65. The method of claim 64, further comprising eluting the bioactive agent from the stent with a gradient of elution profile along the length of the stent.

66. The method of claim 64, wherein :

in the radially expanded condition at the location a first end portion of the stent comprises a first lattice structure;

wherein in the radially expanded condition at the location a second end portion opposite the first end portion comprises a second lattice structure; and

wherein the first and second lattice structures are different.

67. The method of claim 64, wherein:

in the radially expanded condition a body portion of the stent and located between first and second end portions comprises at least one longitudinal segment with a circumferential array of body crowns that are respectively separated along the circumference by gaps across a first inter-crown distance;

wherein in the radially expanded condition the second end portion comprises a circumferential array of end crowns that are respectively separated along the circumference by gaps across a second inter-crown distance; and

wherein the first and second inter-crown distances are different.

68. The method of claim 64, wherein the stent comprises a lattice structure arranged in a pattern around the circumference and between the first and second end portions, and the lattice structure along first and second end portions of the stent comprises a circumferential array of end crowns, and further comprising:

overlapping the array of end crowns along at least one of the first and second end portions in the radially collapsed condition; and

wherein in the radially collapsed condition the lattice structure along the body portion does not comprise overlapping regions.

69. A method for providing an implantable endolumenal stent assembly for use at a location within a lumen in a body of a patient, comprising:

forming an implantable stent with a first end portion with a first end, a second end portion with a second end, a body portion between the first and second end portions, a length between the first and second ends, a passageway extending along a longitudinal axis between a first longitudinal opening at the first end and a second longitudinal opening at the second end, a circumference around the longitudinal axis, a diameter transverse to the longitudinal axis;

wherein the stent formed comprises a lattice structure constructed of a non-superelastic, non-shape memory metal alloy material;

wherein the lattice structure is formed at an initial memory condition with an initial diameter;

adjusting the lattice structure from the initial memory condition with an initial diameter to a radially collapsed condition with a collapsed diameter that is plasticly deformed from the initial memory condition and is adapted to be delivered to a location within a lumen in a body of a patient;

wherein the lattice structure is adjustable under force from the radially collapsed condition to a radially expanded condition with an expanded diameter that is greater than the collapsed diameter and that is adapted to engage a wall of the lumen at the location;

wherein the initial diameter has a value that is closer to the expanded diameter than to the collapsed diameter.

70. A method for stenting a wall at a location within a lumen in a body of a patient, comprising:

delivering a first stent to a first implant location within the lumen;

delivering a second stent to a second implant location within the lumen that overlaps with the first implant location such that confronting ends of the first and second stents overlap;

wherein the confronting end of each of the first and second stents comprises a lattice structure that is different than a lattice structure along the remaining portion of the respective stent.

71. The method of claim 70, further comprising overlapping the first and second stents in a manner such that their region of overlap does not have a substantially increased thickness profile off the wall of the lumen at the location.

72. A method for stenting a wall at a location within a lumen in a body of a patient, comprising:

delivering a first stent to a first implant location within the lumen;

delivering a second stent to a second implant location within the lumen that overlaps with the first implant location such that confronting ends of the first and second stents overlap at an overlap zone;

eluting a bioactive agent from the first and second stents such that an elution profile at the overlap zone is substantially less than double an elution profile along the remaining portions of the stented segment.

73. The system of claim 31 or 32, wherein the second periodic distance is substantially less than the first periodic distance.